



RECLAIM
ENERGY

Q-ton *Air to Water*

A NEW GENERATION
HIGH EFFICIENCY CO₂
AIR-TO-WATER HEAT PUMP



Commercial applications only

The Q-TON story.

The high efficiency Q-TON is an air-to-water heat pump using CO₂ gas as a refrigerant, which can be used in a variety of applications for the supply of sanitary hot water. Q-TON has been featured as the world's first two-stage compressor (combining rotary and scroll technology). It maintains high efficiency and significantly improves performance at cold outside air temperatures.

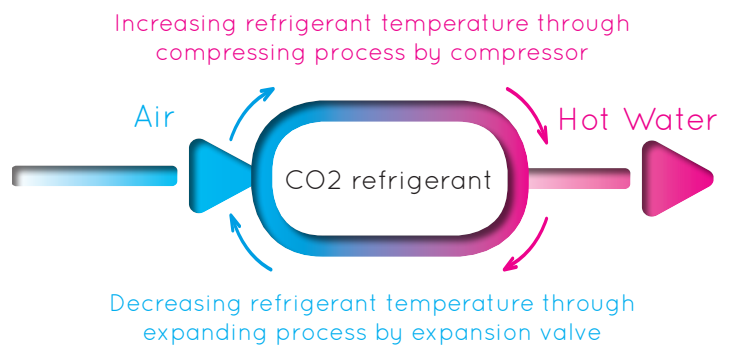
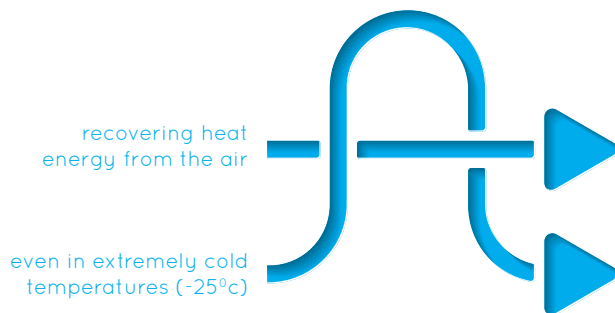
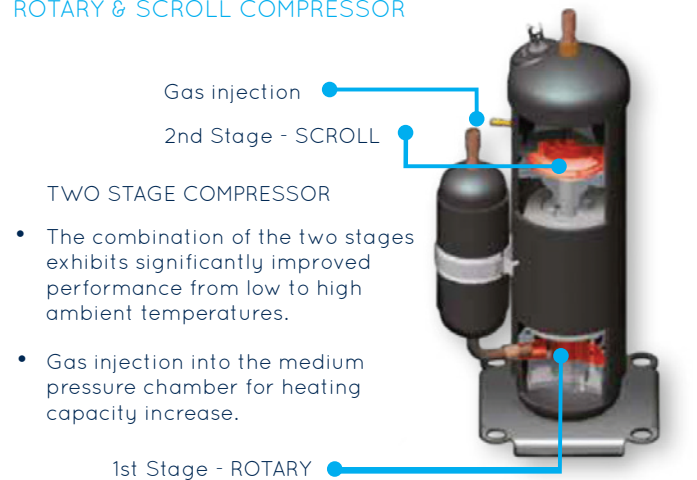
MHI's design team launched this innovative unique air source heat pump to allow maximum efficiency, with minimal carbon footprint all controlled from a comprehensive touch screen panel. Currently with the increasing pressure of the use of low GWP (Global Warming Potential) refrigerant, we believe CO₂ heat pump is the way forward to comply with future regulations as well as market trends.

Q-TON meets a range of disparate demands including the need for medium to large sanitary hot water generation. This involves low electricity consumption and a high level of environmental friendliness.

WORLD'S FIRST

Unique Patented Technology

ROTARY & SCROLL COMPRESSOR



We've always been solution focused.

For improved energy and carbon reduction performances, it is necessary to manage the heat source as well as the heat storage capacity. Q-TON assures this is compatible with on-site hot water requirements. For example a single remote panel can control a unit with the heating capacity of 30kW and up to 16 coupled units (a total of 480kW) for better functionality. This enables the Q-TON to be specified in a vast array of new build or retrofit applications of all sizes.

With an industry-beating coefficient of performance of 4.3, it is the ideal system for serving hot water requirements in commercial buildings like hotels, apartment blocks, restaurants, fitness centres, universities, hospitals, care homes, laundries and food industries.

Systems can be set up to meet specific requirements and a touch screen controller makes the system simple to operate while the user-friendly graphic display enables to monitor hot water production and availability.

L I T R E S / D A Y

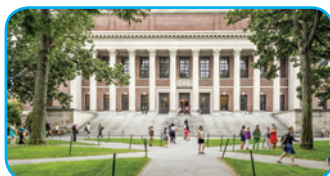
Leisure Centres / Restaurants

3,000



Care Homes / Universities

5,000



Hotels / Spas

10,000



Apartment Blocks

15,000



Why Q-TON?

Q-TON delivers outstanding performance and environmental benefits to a varied number of applications. Q-TON is exceptionally energy efficiency which results in big reductions in both power and carbon emissions.

Q-TON uses safe and highly efficiency CO₂ as a refrigerant which is environmentally friendly as it is a natural gas and does not contain harmful

ecological impacts compared to other products using standard refrigerants.

Furthermore the Q-TON uses a constant hot water supply from 60°C to 90°C and maintains the full capacity at a very low ambient temperature. Therefore there is no requirement for external heating source and as a result this saves valuable installation time and costs.



High Performance

- 60°C to 90°C water supply even with outside temperatures as low as -25°C
- The ability to maintain 100% capacity down to -7°C



High Efficiency

- The industry's highest coef of performance (4.3 in intermediate season)*
- Massive reductions in both running costs and CO₂ emissions



Environmentally Responsible

- GWP (Global Warming Potential) = 1
- ODP (Ozone Depletion Potential) = 0



Easy Operation

- Advanced, but simple to operate touch screen panel with LCD
- User-friendly schedule setting and one-touch II up operation

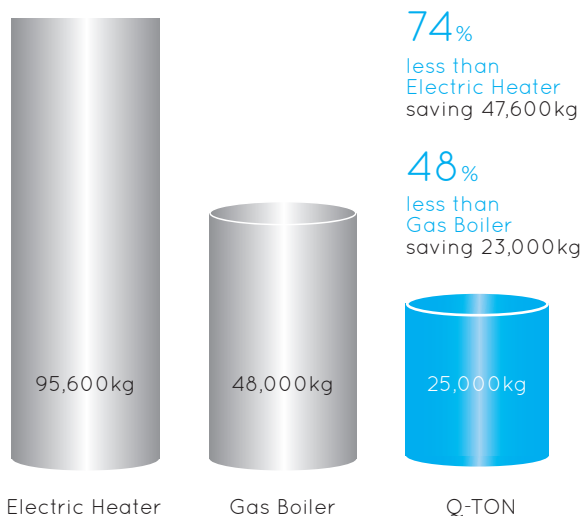


Long-term Reliability

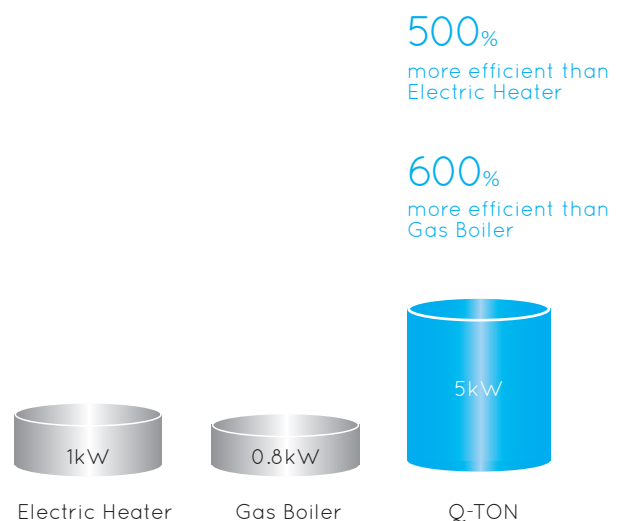
- High quality robust technology
- Long life expectancy

* Intermediate season conditions: Air on at 16°C, Water on at 17°C, Water off at 65°C

Annual CO₂ emission



Energy produced per kW consumed



Operation conditions: senior care home, 80 persons, 8,000L/day, 60°C conversion

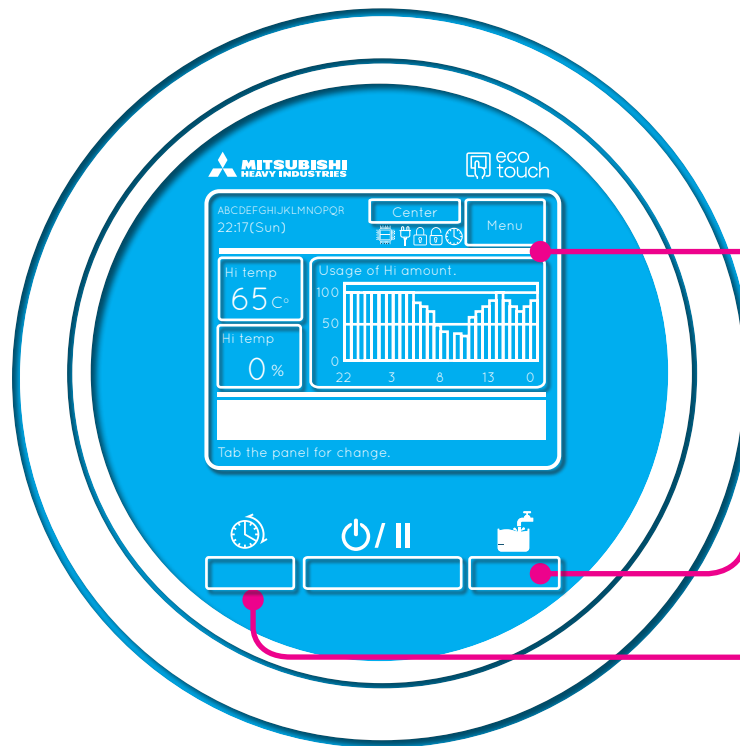
Q-TON will contribute to reduce carbon emissions for any organisation associated with a Carbon Reduction Commitment (CRC) scheme. Further savings are expected as the electricity becomes greener with the decarbonisation of the grid.

How Q-TON works.



Easy operation

- Advanced touch screen remote
- Controller panel.
- Full dot liquid crystal display.
- Allows finely adjusted operation for energy savings.



PERFORMANCE

-25°C → 90°C

90°C water supply even in extremely cold regions with temps as low as -25°C

CAPACITY

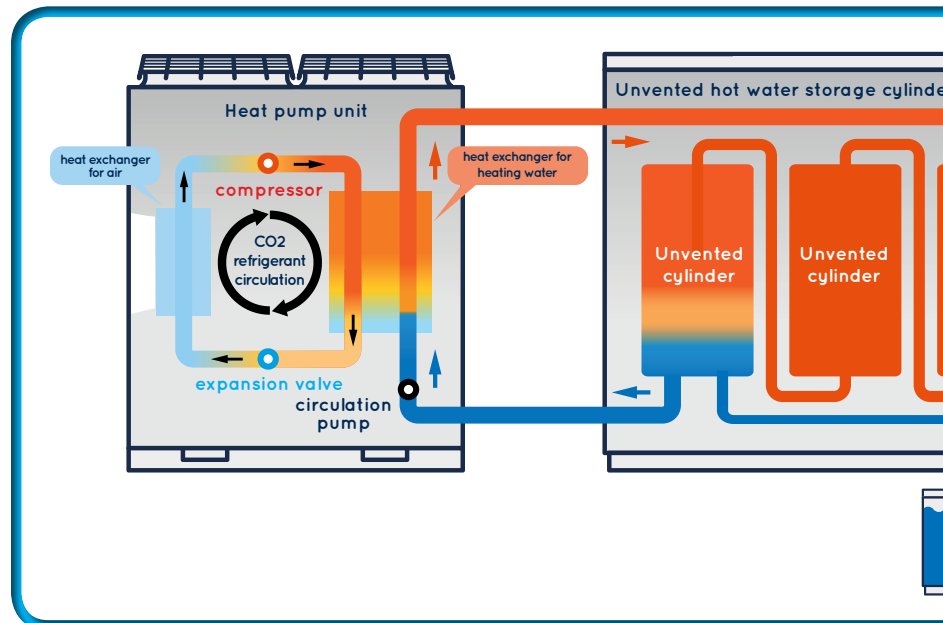
-7°C → 100

Keeping 100% capacity down to -7°C

EFFICIENCY

COP 4.3

The industry's highest COP level
COP4.3 (intermediate season)



Environmental Credentials

Q-TON heat pumps can be configured as stand-alone units or run with up to 16 units in tandem, providing anything from 3,000 to 100,000 litres of safe hot water daily. Whether single or multiple units are used, the Q-TON system is controlled from a single, simple control panel that can be remotely installed for ease of access and operation. Q-TON can be installed as a replacement, addition or whole new system, according to your needs.

Refrigerant such as carbon dioxide (R744) preserves the ozone layer (ODP = 0) and has the lowest Global Warming Potential (GWP = 1). Q-TON fits extremely well with the latest building regulations reaching the "excellent" mark from BREEAM.

BREEAM®

Q-TON meets the stringent requirements of world's foremost environmental assessment method and rating system BREEAM.

Why Q-TON?



User Friendly

- LCD panel with light tap
- Operation introduced as the industry's first.
- Large 3.8 inch full dot display.
- Back light function.



Fill Up Operation

Regardless of the setting that has been applied, there is always the functionality to manually refill the tank.



Schedule Setting

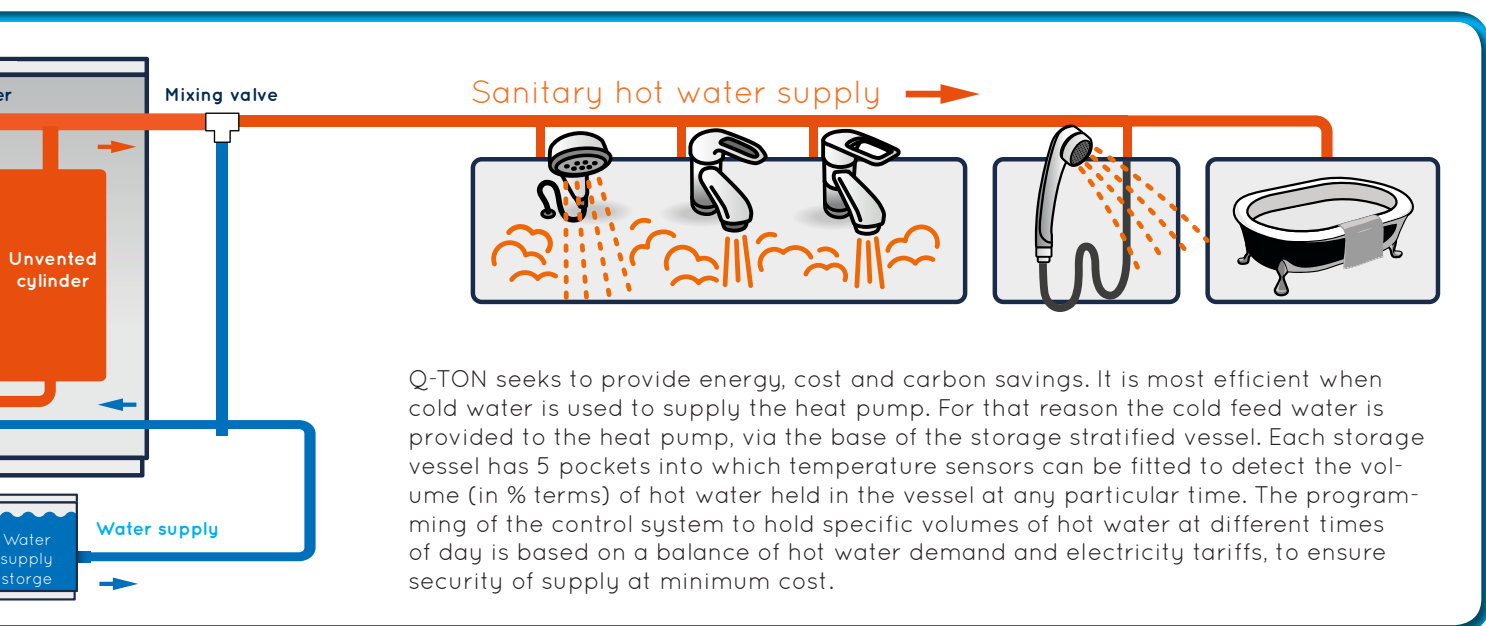
Set a schedule such as a weekly operation pattern, day off or a peak-cut timer.

Q-TON absorbs 'free' heat from outdoor air and amplifies it to generate hot water swiftly and efficiently. It generates hot water up to 90°C without the requirement for an additional electric immersion heater.

The Q-TON heat pump uses a coil of cold refrigerant that absorbs 'free' heat from the outside air and a 2-stage compressor that puts the refrigerant under high pressure in order to raise its temperature. An on-board heat exchanger uses heat from the refrigerant to generate the sanitary hot water.

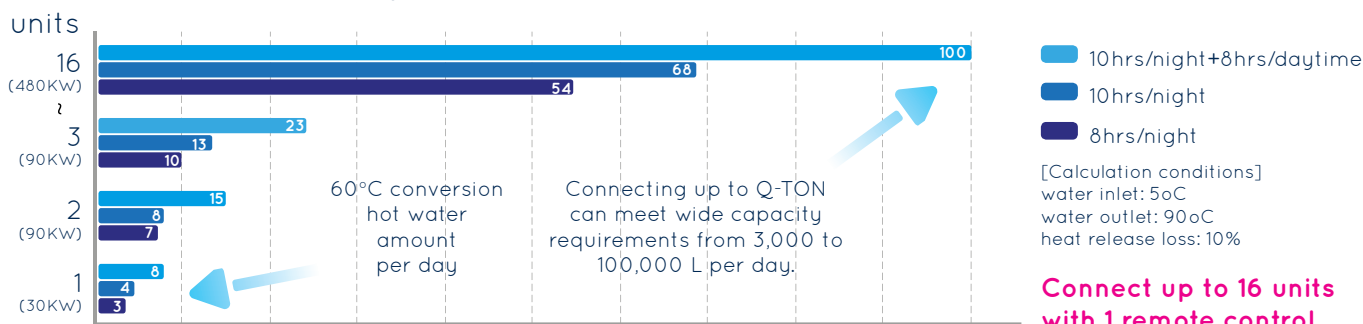
Hot water can be produced during off peak tariff electricity which is then stored in a tank for daytime use. Q-TON efficiently produces high-volume hot water using just ambient air heat and a small amount of electricity.

Q-TON is usually used for direct boiler replacement as it controls the water supply and storage temperature as well as the output capacity.



Q-TON seeks to provide energy, cost and carbon savings. It is most efficient when cold water is used to supply the heat pump. For that reason the cold feed water is provided to the heat pump, via the base of the storage stratified vessel. Each storage vessel has 5 pockets into which temperature sensors can be fitted to detect the volume (in % terms) of hot water held in the vessel at any particular time. The programming of the control system to hold specific volumes of hot water at different times of day is based on a balance of hot water demand and electricity tariffs, to ensure security of supply at minimum cost.

Q-TON Sizing Guidance



Specifications.

Item		Model	ESA30E-25
Power supply			3-phase 380V $\pm 5\%$, 400V $\pm 5\%$, 415V $\pm 5\%$ 50Hz
Operation to top up (In intermediate season)	Heating capacity	kW	30
	Water amount	Liter/min	8.97
	Power consumption	kW	6.98
	COP	-	4.3
Operation to top up (In cold region)	Heating capacity	kW	30
	Water amount	Liter/min	5.06
	Power consumption	kW	10.73
	COP	-	2.8
Operation sound		dB(A)	58
Outside dimension	Height	mm	1,690
	Width	mm	1,350
	Depth	mm	720 + 35 (Water pipe connection)
Current	Max	A	21
	Starting	A	5
Unit weight		kg	375 (During operation 385)
Colour			Stucco white (4.2Y7.5/1.1 approx.)
Compressor	Type x Pcs		Hermetic inverter compressor x 1
	Nominal output	kW	6.4
Refrigerant	Type		R744 (CO ₂)
	Charged amount	kg	8.5
Refrigerant oil	Type		MA68
	Charged volume	cc	1200
Crankcase heater		W	20
Anti-freezing heater	for water pipe	W	21 x 3
	for drain pan	W	40 x 2
	for drain hose	W	16 x 3
Heat exchanger, Air side			Copper pipe straight fin type
Heat exchanger, Water side (Gas cooler)			Copper pipe coil type
Fan	Type		Axial flow type (direct coupled motor) x 2
	Output x Pcs	W	386 x 2
	Air volume	m ³ /min	260
Water pump	Type x output		Non-self-suction spiral type inverter pump x 100W
	Materials contacting to water		Bronze, SCS13
	Actual pump head	m (kPa)	5m (49kPa) @17Liter/min
Usage temp range	Outdoor air temp	°C	-25 to +43
	Feed water inlet temp	°C	5-63
	Hot water outlet temp	°C	60-90
Water pressure range		kPa	500 or lower
Defrost			Hot gas type
Vibration and sound proofing devices			Compressor: placed on anti-vibration rubber and wrapped with sound insulation
Protection devices			High pressure switch, over current protection, power transistor overheat protection and anomalous high pressure protection
Pipe size	Feed water inlet		21 x 3
	Hot water outlet		40 x 2
	Drain water outlet		16 x 3
Electric wiring	Earth leakage breaker		21 x 3
	Power cable size		40 x 2
	Moulded-case circuit breaker		16 x 3
	Grounding wire size		16 x 3
	Remote controller wire size		16 x 3
Design pressure		MPa	High pressure: 14.0, Low pressure: 8.5
IP code			IP24

(Note)

- Performance of operation to top up in intermediate season shows the capacity measured under the conditions that outdoor air temp is 16°C DB/12°C WB, water inlet temp is 17°C and hot water outlet temp is 65°C.
- Performance of operation to top up in cold region shows the capacity measured under the conditions that outdoor air temp is 7°C DB/-8, WB, water inlet temp is 5°C and hot water outlet temp is 90°C excluding heater for anti-freezing water (345W).
- Operating sound shows a value measured at 1m in front of the unit and 1m above the floor in anechoic room where the sound is resonant a little. Accordingly if the unit is installed on actual site, it is normal that the measured sound there is higher than the value shown above, because it is influenced by surrounding noise and echo in the room.
- The actual hot water outlet temp may vary $\pm 3^\circ\text{C}$ from target temp according to the change of outdoor air temp and water inlet temp. And then if feed water inlet temp is 30°C or higher and outdoor air temp is 25°C or higher, hot water outlet temp may be controlled not to increase too high.
- Please use the clean water. The water quality should follow a guideline of JRA-GL 02:1994. If the water quality is out of the standard, it may cause troubles such as scale buildup and/or corrosion.
- These articles may vary without any notice according to the development status.

Superior technology that outlasts and performs

For our customers it's comforting to know that we always listen to their needs when developing our products. As an engineering company built on problem solving, we understand that not every requirement has a ready-made answer.

We offer high-efficiency systems for cooling and heating air and water in residential, commercial and industrial applications. As a reputable engineering company with vast expertise and experience, we are fully equipped to meet all your HVAC needs.

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Mitsubishi Heavy Industries, Ltd.
Air-conditioning & Refrigeration Systems Headquarters
Certificate number: JZ44708



**MITSUBISHI HEAVY INDUSTRIES-
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Certificate Number: 01100 1988 9813



**Mitsubishi Heavy
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Certificate Number: 5175-1986-AHQCS-AUK

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Mitsubishi Heavy Industries, Ltd.
Air-conditioning & Refrigeration Systems Headquarters



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